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(54) Low voltage-drop electrical contact for gallium (aluminium, indium) nitride

(57) An electrical contact (130, 230, 330, 430) that comprises a layer (118) of a p-type gallium nitride material, a metal layer (134), and a intermediate layer (132, 232, 332, 432) of a material different from the gallium nitride material and the metal layer. The intermediate layer is sandwiched between the layer of p-type gallium nitride material and the metal layer. The material of the intermediate layer (132) may be a Group III-V semiconductor that has high band-gap energy, lower than that of the p-type gallium nitride material. The intermediate layer (232) may alternatively include layers (e.g., 240, 242, 244) of different Group III-V semiconductors. The layers of the different Group III-V semiconductors are arranged in order of their band-gap energies, with the Group III-V semiconductor having the highest band-gap energy next to the layer of the p-type gallium nitride material, and the Group III-V semiconductor having the lowest band-gap energy next to the metal layer. As a further alternative, the material of the intermediate layer (332) may be a metal nitride. As a yet further alternative, the material of the intermediate layer (432) may be a gallium nitride material in which a percentage of the nitrogen atoms are replaced by a mole fraction x of atoms of at least one other Group V element. The value of x is close to zero next to the layer (118) of the gallium

zero next to the metal layer (134).

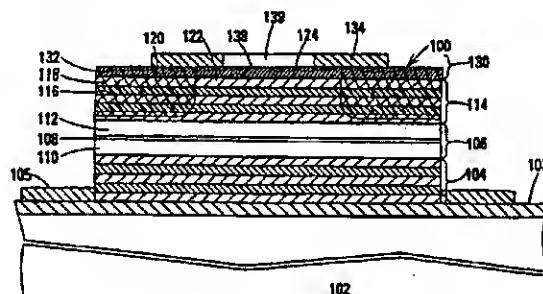


FIG.1



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.6)		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim			
X	PATENT ABSTRACTS OF JAPAN vol. 096, no. 012, 26 December 1996 & JP 08 213651 A (MITSUBISHI CHEM CORP), 20 August 1996 * the whole document *	1-3,11, 12	H01L29/45 H01L33/00		
A	---	4,5, 13-16			
X	PATENT ABSTRACTS OF JAPAN vol. 096, no. 002, 29 February 1996 & JP 07 2B3167 A (SUMITOMO CHEM CO LTD), 27 October 1995 * the whole document *	1-3,11, 12			
A	---	6,10			
A	PATENT ABSTRACTS OF JAPAN vol. 018, no. 255 (E-1548), 16 May 1994 & JP 06 037355 A (NIPPON TELEGR & TELEPH CORP), 10 February 1994 * abstract *	---			
Y	"HIGHER VISIBILITY FOR LEOS MORE LIGHT-SOME OF IT BLEU-FROM LESS POWER UNVEILS BRIGHT VISTAS OF NEW APPLICATIONS FOR THE LATEST LIGHT-EMMITTING DIODES" IEEE SPECTRUM, vol. 31, no. 7, July 1994, pages 30-34, 39, XP000460429 * page 39; figure B *	9,10,15, 16	TECHNICAL FIELDS SEARCHED (Int.Cl.6)		
Y	EP 0 042 066 A (IBM) 23 December 1981 * claims 1-6; figure 1 *	9,10,15, 16	H01L		
A	FR 2 696 27B A (THOMSON CSF) 1 April 1994 * figures 1A,1B,3 *	9,10			
The present search report has been drawn up for all claims					
Place of search	Date of completion of the search	Examiner			
BERLIN	13 November 1998	Juhl, A			
CATEGORY OF CITED DOCUMENTS					
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document					
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